

DESTRUCTION OF HARVESTER ANT COLONIES BY  
INVADING FIRE ANTS IN SOUTH-CENTRAL TEXAS  
(HYMENOPTERA: FORMICIDAE)

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Competitive replacement of native ants by *Solenopsis invicta* has been reported for a number of ant species (Glancey et al., 1976; Porter and Savignano, in press), including the harvester ant *Pogonomyrmex badius* (Wilson and Brown, 1958). However, the mechanisms by which fire ants replace these species remain unknown. Several studies have examined aggressive interactions between *S. invicta* and other ants under experimental conditions (Bhatkar et al., 1972; Jones and Phillips, 1987; Bhatkar, 1988), but interactions in the field are not easily observed. The purpose of this note is to report observations on the destruction of field colonies of *Pogonomyrmex barbatus* by invading colonies of the polygyne or multiple-queen form of *S. invicta*. This study was conducted at the Brackenridge Field Laboratory of the University of Texas, Austin (February 1987 to August 1989).

At Brackenridge Field Laboratory, the spread of *S. invicta* has advanced slowly along an irregular but sharply defined front (Porter et al., 1988). We recorded five colonies of *P. barbatus* directly attacked by *S. invicta* in areas subsumed by the advancing front; only one of these colonies survived. Several other nearby colonies also disappeared during our observations, presumably due to attack by *S. invicta*.

The following observations deal with one of these colonies that received attention throughout its attack. This conflict was first discovered on 12 February 1987 and may have been in progress several days as hundreds of dead and dying *P. barbatus* lay scattered over their mound. Dead *S. invicta* were also numerous. One minor fight was noted where several *P. barbatus* were fighting dozens of *S. invicta*. At least 50 *P. barbatus* had climbed grass stems surrounding the mound, remaining stationary for an indeterminant period at heights of 5 to 20 cm. Fire ants forage through a network of underground tunnels (Markin et al., 1975). This battle was probably initiated below ground,

when one of these tunnels was extended into a nest gallery of *P. barbatus*, because when observed, *S. invicta* was not utilizing the harvester ant nest entrance.

On 13 February, the mound had one limited area of activity; *S. invicta* were coming out of the ground and were recruiting to seven *P. barbatus* that had recently been killed on the surface. Only 12 *P. barbatus* remained on grass stems. We noted two groups of live and injured *P. barbatus* (approximately 20/group) occupying sites on two major trunk trails; both groups were within 30 cm of the mound's edge. Of the 777 dead and dying *P. barbatus* collected from an area encompassing the mound and a 1-m perimeter surrounding it, 196 had from one to four dead *S. invicta* attached to legs or antennae for a total of 357 *S. invicta*. Of the 357 *S. invicta*, 205 were attached to legs and 152 to antennae. Numbers of workers that remained on grass stems along trunk trails decreased over the next 3 days. Counts of dead and dying individuals also decreased during this period (14 February,  $n = 123$ ; 15 February,  $n = 86$ ; 16 February,  $n = 63$ ).

This nest was observed periodically for 2 additional months. Another attack was recorded on 22 February. Thirty freshly killed *P. barbatus* were found on the mound along with about 10 live workers that were under attack by *S. invicta*. On 22 March, we found three *P. barbatus* workers that were moving on the mound, six that were under attack and near death, and 44 dead workers scattered across the mound. On 1 April, two *P. barbatus* were crawling on the mound and six recently killed workers were found on or at the mound's edge. Thus, a total of 1,235 dead *P. barbatus* were collected from the surface of this nest over a 6- to 7-week period. No signs were seen of this colony emigrating and a thorough search of surrounding areas failed to reveal any new colonies. Subsequently, irregular inspections of this colony, for over a year, confirmed that it

had been destroyed by *S. invicta*. Workers in this colony of *P. barbatus* survived for about 7 weeks under the attack of *S. invicta*.

Attacks on all five colonies of *P. barbatus* were initiated after several small to medium sized mounds of *S. invicta* became established in the nest clearing surrounding the entrance of the nest of *P. barbatus*. Although harvester ant colonies at Brackenridge Field Laboratory have generally survived for several years after the invasion of fire ants, most were eventually eliminated. The primary mode of competitive replacement at Brackenridge Field Laboratory was clearly aggressive interference. Competition for food is unlikely because harvester ants are primarily granivores, whereas seeds account for <5% of the fire ant diet. The invasion and establishment of *S. invicta* at Brackenridge Field Laboratory has been responsible for the elimination of several dozen native ant species (Porter and Savignano, in press). However, it remains unknown whether the primary mode of replacement of these species occurs through exploitation or aggressive interference.

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